
Tactical Water
Distribution System
TWDS

TWDS

- Characteristics
- Capabilities

Characteristics

Not intended for brackish or contaminated water, or at temperatures below 32 Deg. F

CAPABILITIES

- **Transports 600 GPM across level terrain**
- **846,000 gallons in a 24 hr period**
- **Can be assembled for operation within 48 hrs.**

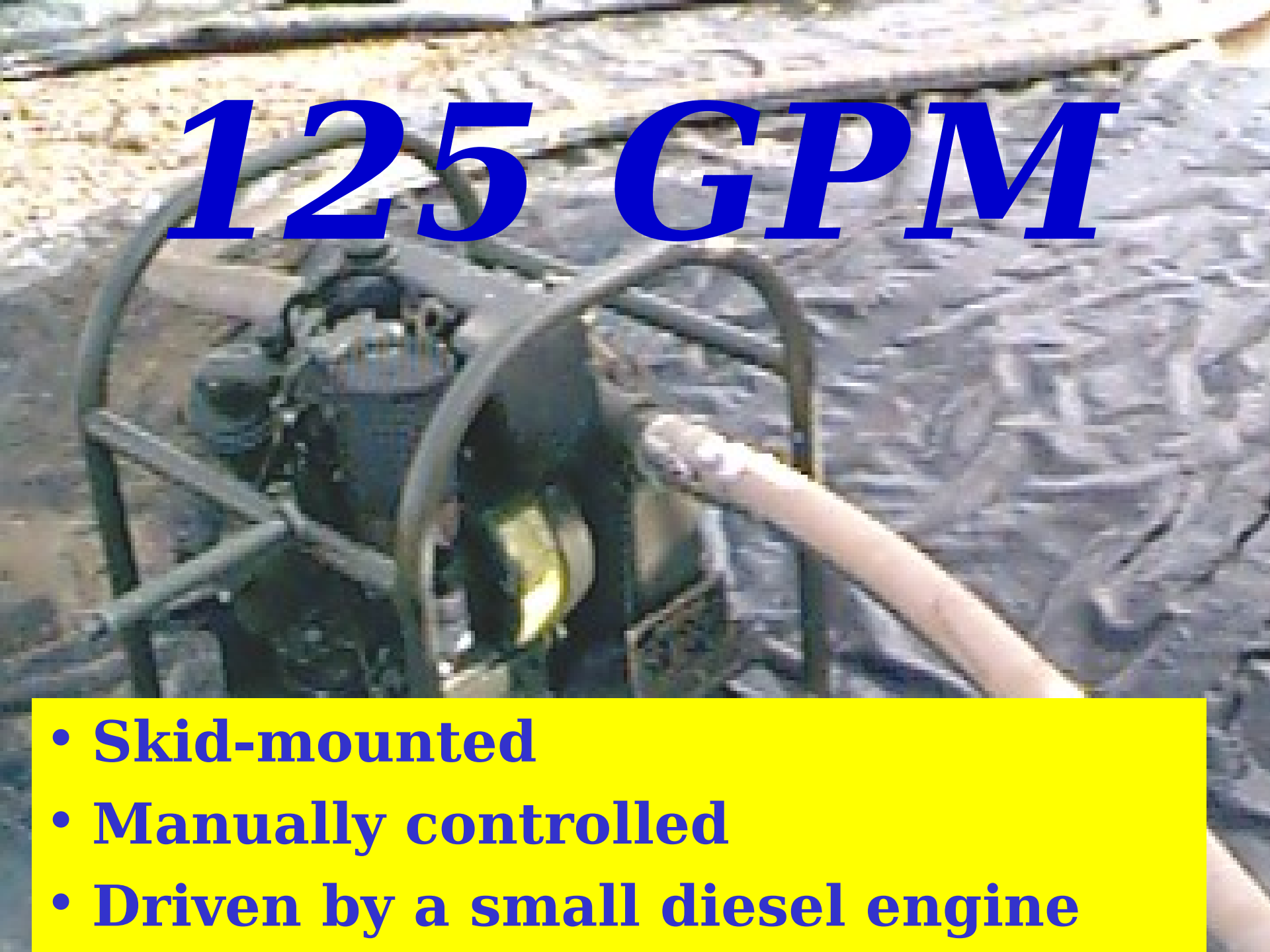
Components

Storage Assemblies

- 2 - 20,000 gallon collapsible tanks
- Fill rate is controlled by gate valve
- Used for storage or to supply water to the distribution point

Distribution Points

- **2 - Distribution Points**
  - **125 gpm**
  - **Hypochlorination Unit**
  - **Hose network & Manual Dispersing Stations**



- **Skid-mounted**
- **Manually controlled**
- **Driven by a small diesel engine**

Hypochlorination Unit

- Skid-mounted
- Powered by impulse
- Rate controlled by valves

Hose Network

- Networks end at four manual dispersing stations, with elbow valves or nozzles
- Rate of water flow controlled by adjusting on-line gate valves

Tripods must be at least 6 ft tall and capable of supporting 400 lbs.

Lister Bag has a 36 gallon capacity, and is made of cotton duck. It hangs on a stand with faucets on the bottom of the bag.

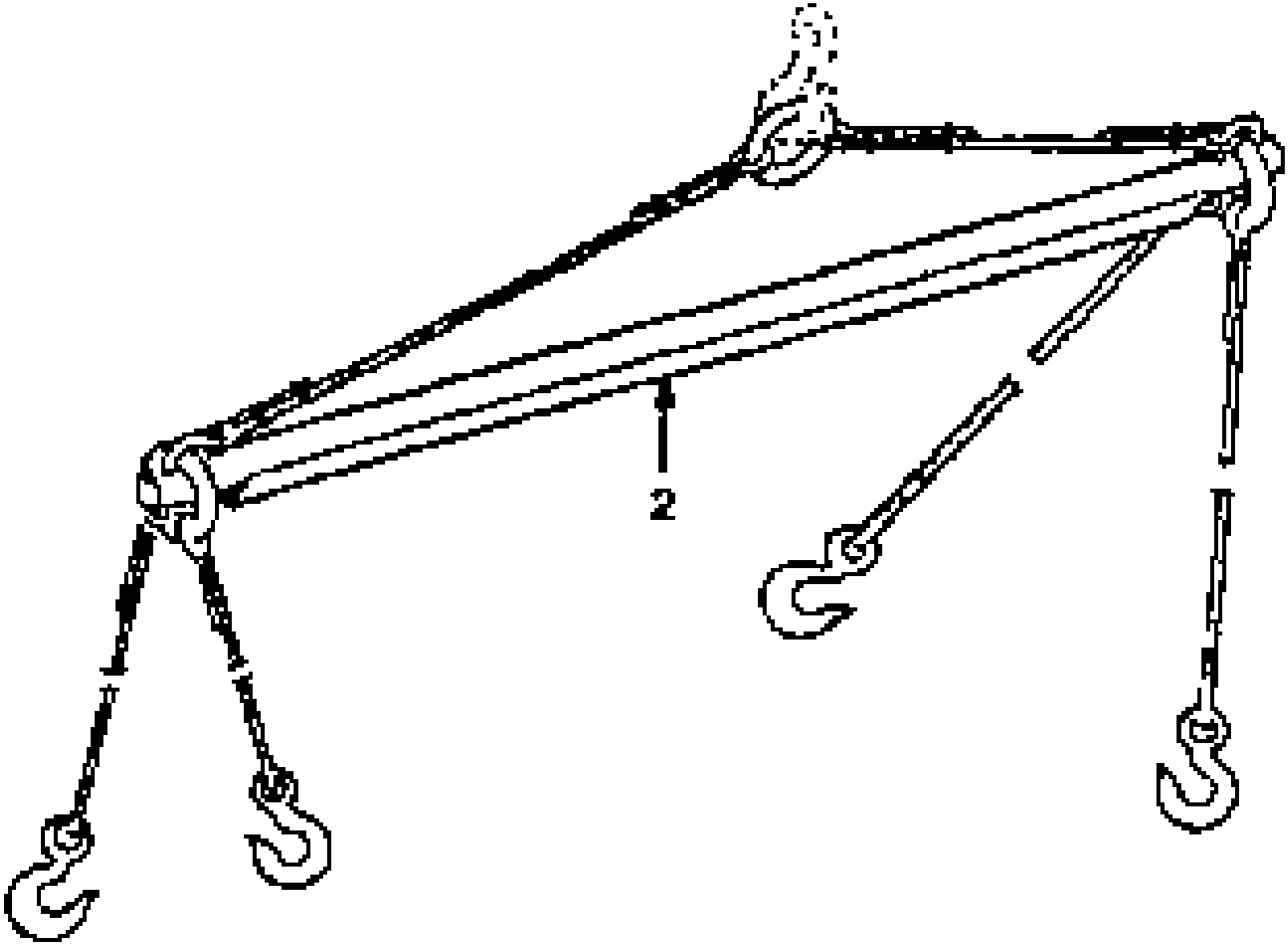
10 Mile Hose Line Segment

- 6 in. x 500 ft. collapsible hose
- Transfers Water
- Suspension devices for obstacles
- road crossing guards
- end cap for a dead-end service
- Can be coupled with another TWDS or distribution & storage system

Components of the 10 Mile Hose Line Segment

- **Packed in 34 crates**
- **32 crates contain hoseline, each crate with four flaking boxes and each flaking box containing one 500 ft hose assembly.**


Flaking Box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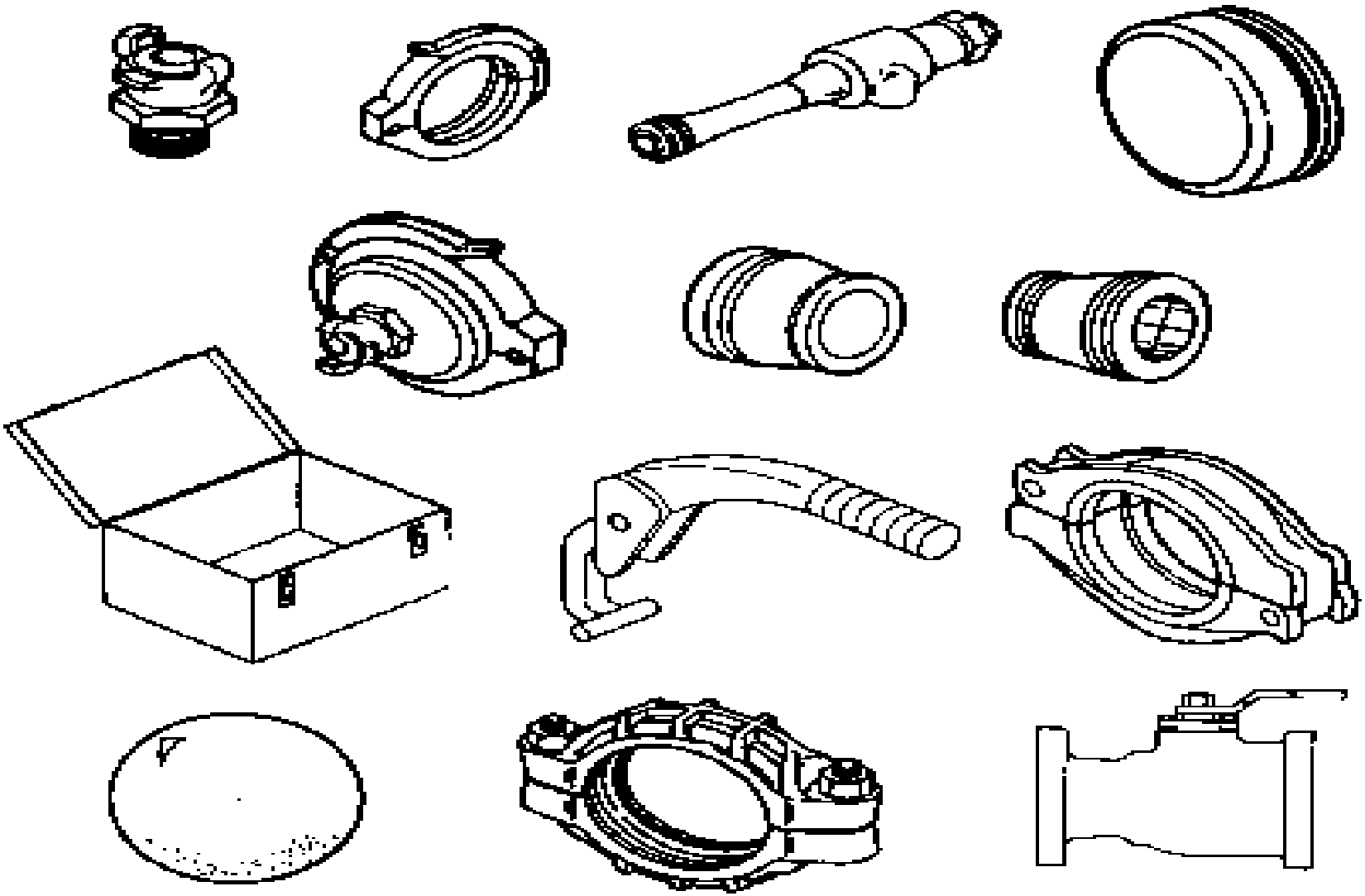
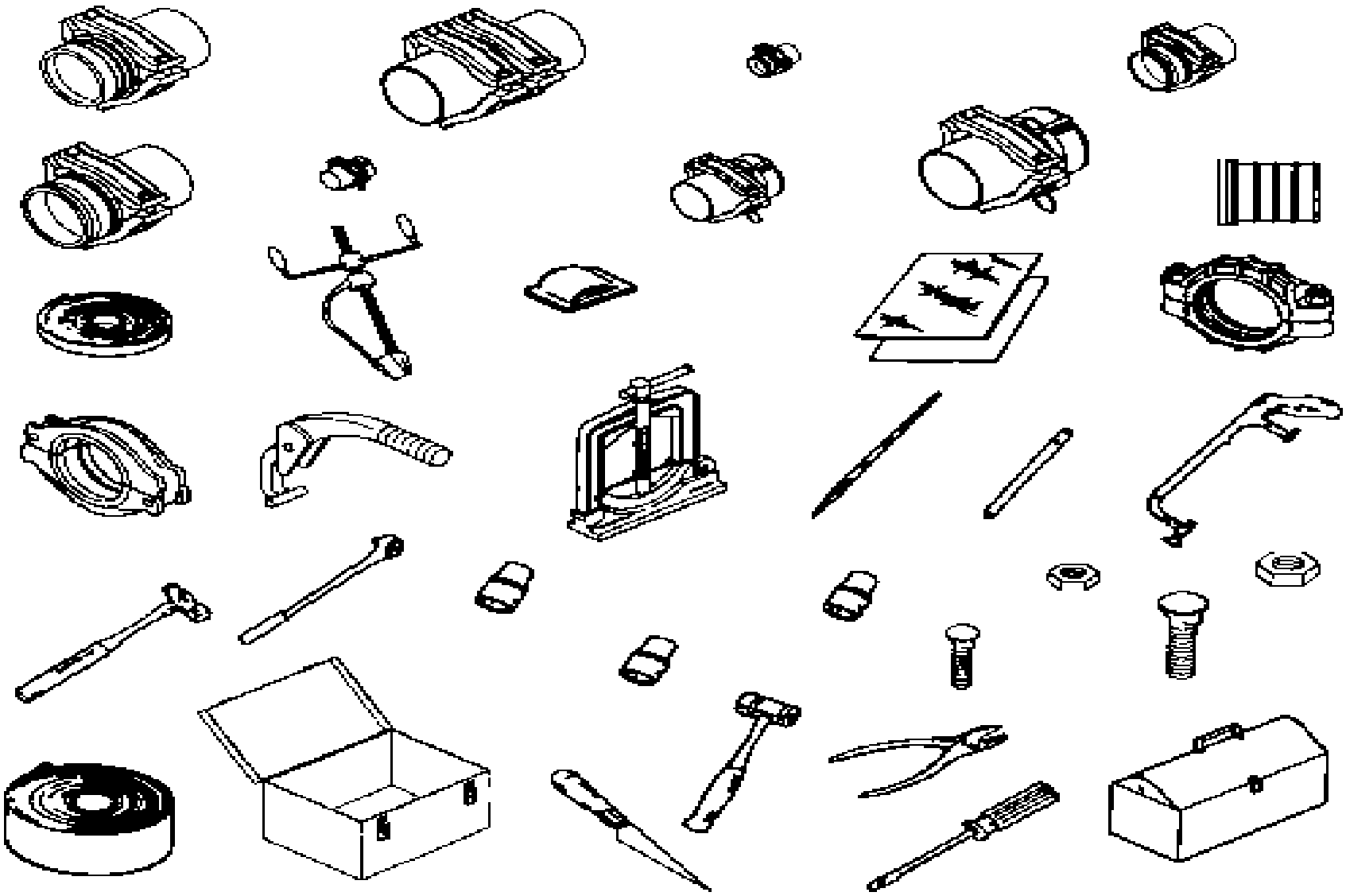
Road Crossing Guard

Suspension kit is used to cross small streams or deep gaps. May also be used to cross roads where digging is not practical.



DISPLACEMENT / EVACUATION KIT



HOSE REPAIR KIT

Pumping Stations

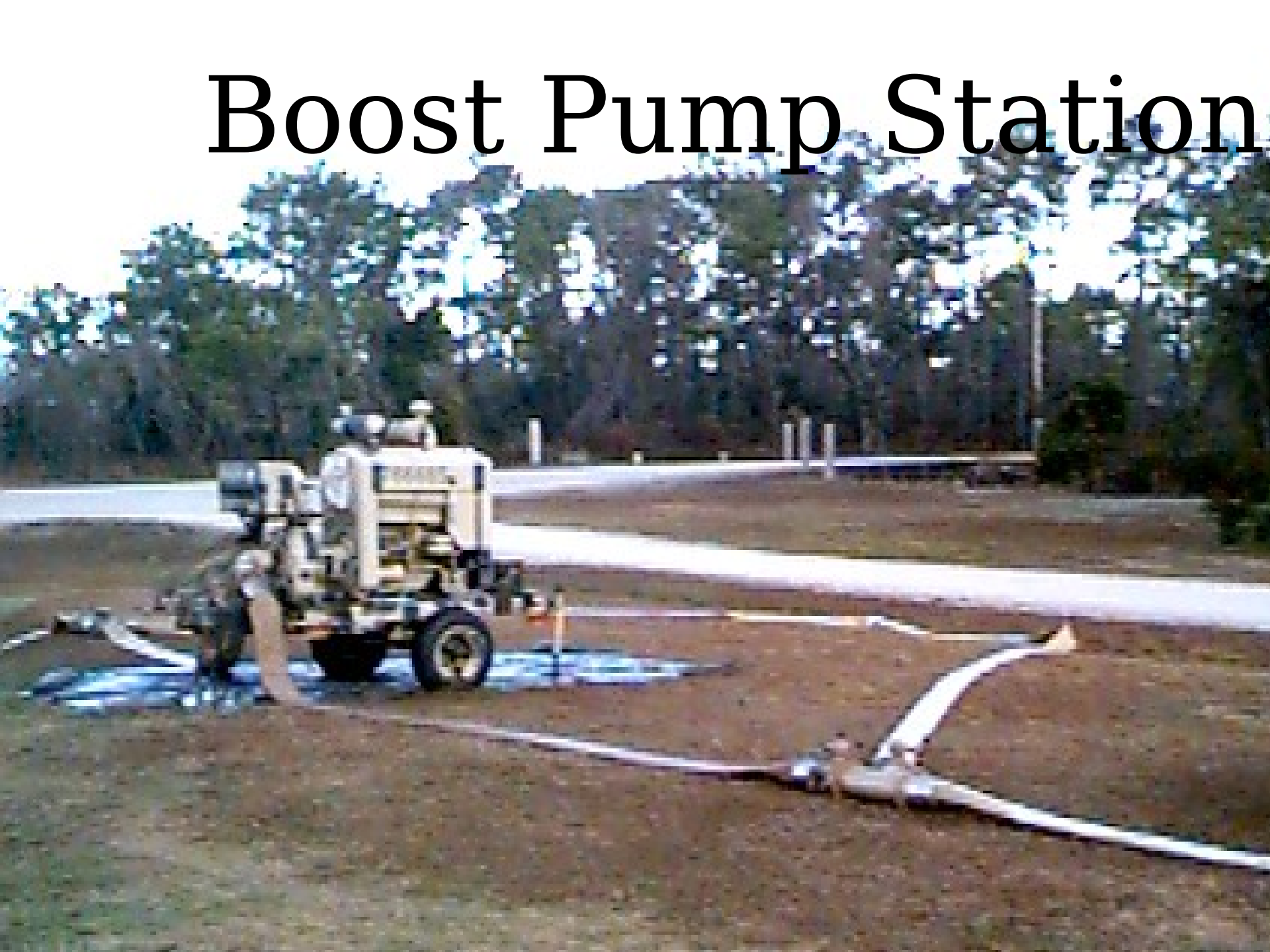
- **Five pumping stations are required for smooth terrain with a sixth as a spare**
- **Six pumping stations are required for rough terrain**

Pump Station

- Each pumping station consists
  - trailer mounted pump assembly
  - check valve
  - butterfly valves
  - several 6 in. hose assemblies
- Powered by a six cylinder diesel engine
- Controlled through a panel on the pump

Lead Pump Station

Boost Pump Station



1 Minute Break

Setting Up The System

TWDS

- Site Location

Site Considerations

- Thorough study of terrain is required
- General route for hose line & locations for pump stations, storage assemblies, & distribution points determined from maps
- On or near roads
- Avoid routes along banks of streams, marshes, ponds, gullies, ravines, or areas subject to flooding
- When possible hose needs to be on firm, dry, level ground
- Other considerations
  - will the TWDS operate independently or as part of a larger system
  - assigned mission for TWDS
  - expected length of time the TWDS will be required to operate
  - Elevation differences and distance

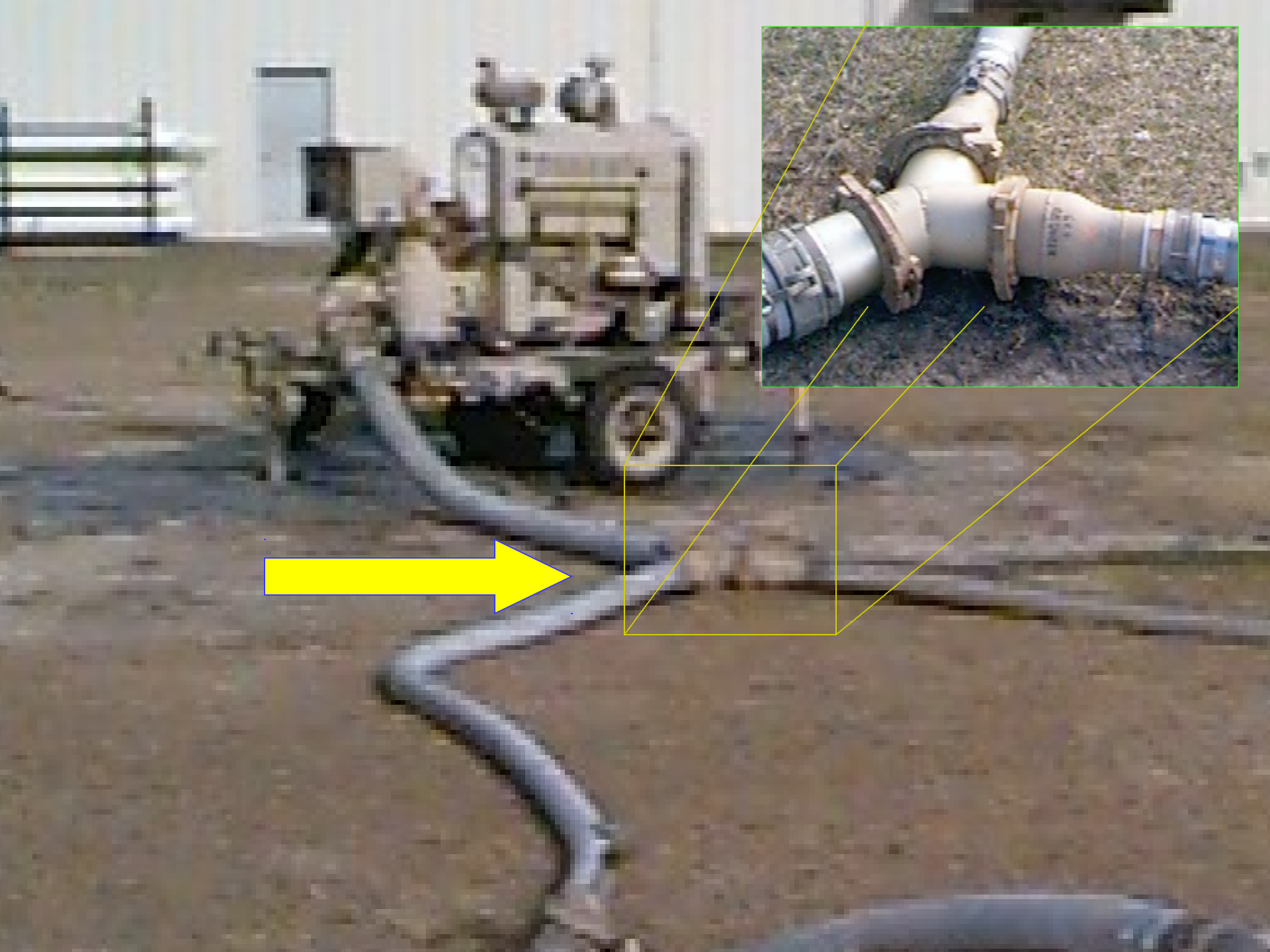
Placement of Pumping Stations

- **Location of the pump stations is determined by location of water source**
- **Boost pump stations are intended to be at 2 mile intervals, assuming ground is level**
- **A substantial rise and fall may require adjustment of standard spacing:**
  - **If next down line station is higher in elevation than the up line station, then the distance between them is decreased**
  - **If next down line station is lower in elevation then the up line station , the distance between them is increased**

Adjustments to spacing between pumping stations (due to elevation changes) assures that water pressure will be maintained within optimum operational range of 20 psi under normal conditions.

Installation of Lead Pump


nstall butterfly valve
inlet on suction side



Install Discharge Side

Ensure you install the check valve in the proper direction

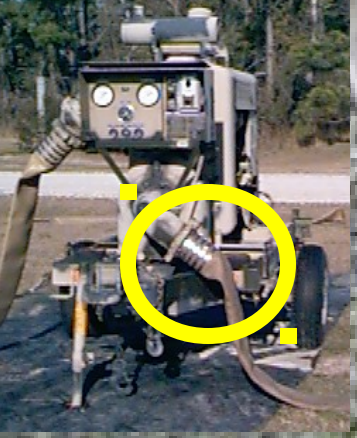

CLOSE

Assembly of 10 Mile Hose Segment


1st Connection of 500' from Lead Pum

- **Lay the hose until the hose line in all four boxes have been flaked**
- **Reload with 4 new flaking boxes**
- **Connect the bottom hose to the last laid out and continue the laying process**

Assembly of Booster Pump Station

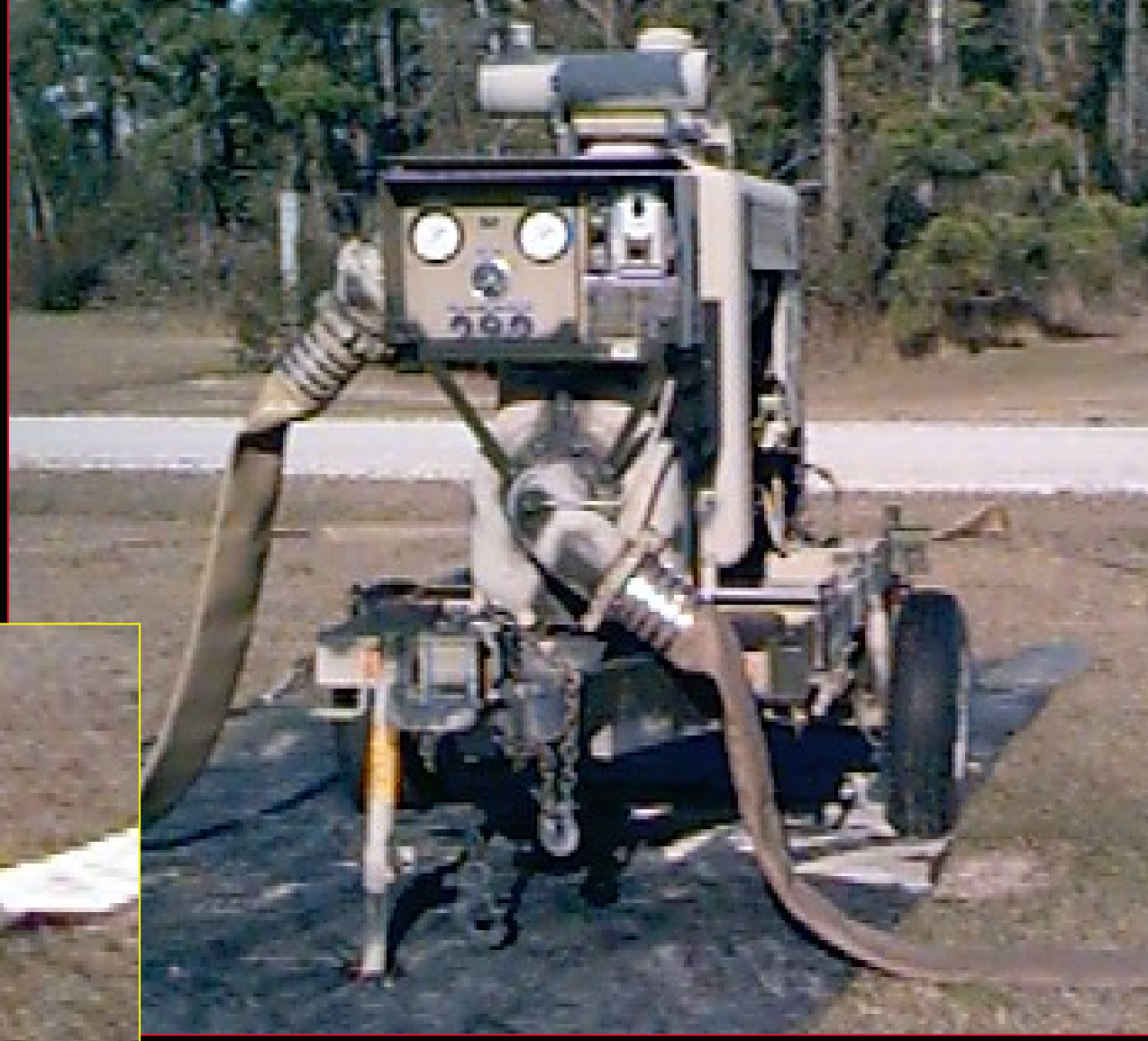


6” x 10’
Discharge
Hose to Suction Port

Bypass 75 ft Ho

Butterfly
Valve

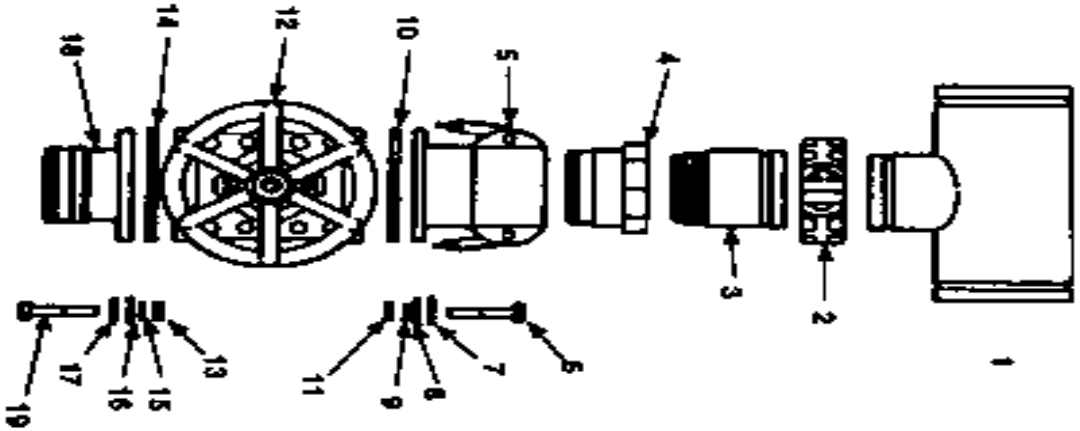
10 Mile
Segment

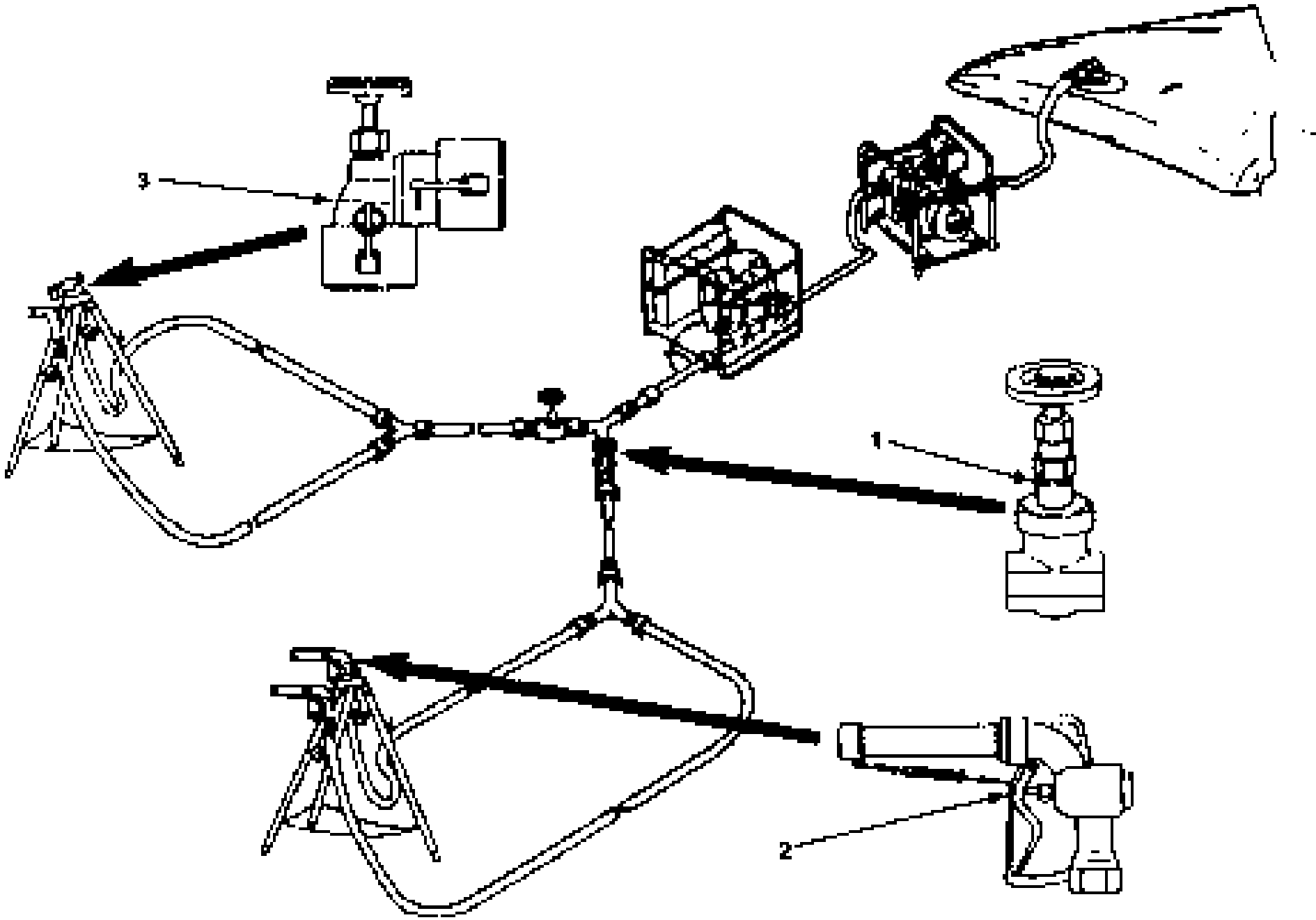


TWDS

- Assembly of Distribution Points

Positioning of distribution points depends on the mission. They can be located at any suitable site along the 10 mile hose line route


14
12
10
5
4
3
2
1
13
17
16
15
11
9
8
7
6


3
1
2

The use of adapters may be required for proper connection of male and female ends. Make all required adjustments accordingly

TWDS

- Overcoming Obstacles

CROSSING ROADS

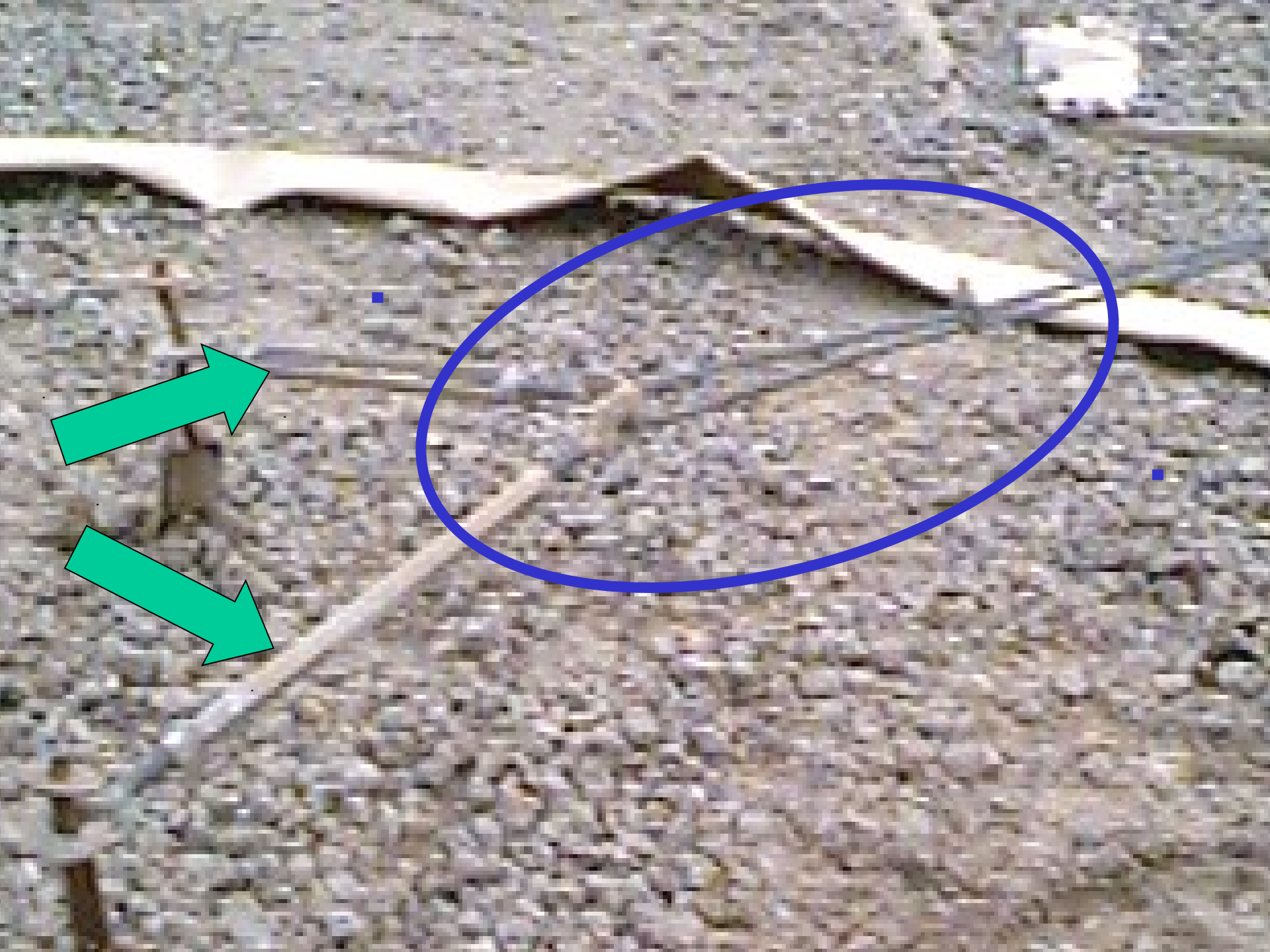

18”
26”

Back fill trench
Continue laying operations

CROSSING STREAMS OR DEEP GAPS

Up to 75 feet 4 x 4’s
Over 75 feet 6 x 8’s
Trees may be used


ve anchor 15 ft from tower at 30° an
n line with tower 6 in. above ground



Empty Hose

Full Hose

Span Distance Dimension A (Feet)	Maximum Sag Dimension B (Feet)	Span Distance Dimension A (Feet)	Maximum Sag Dimension B (Feet)
25	1.5	25	2.25
50	3	50	4.50
75	4.5	75	6.75
100	6.5	100	9
150	9.5	150	13.50
200	13	200	18


en hose is in place, use a few mo
dles to ensure hose is graduated
the cable and prevents kinks

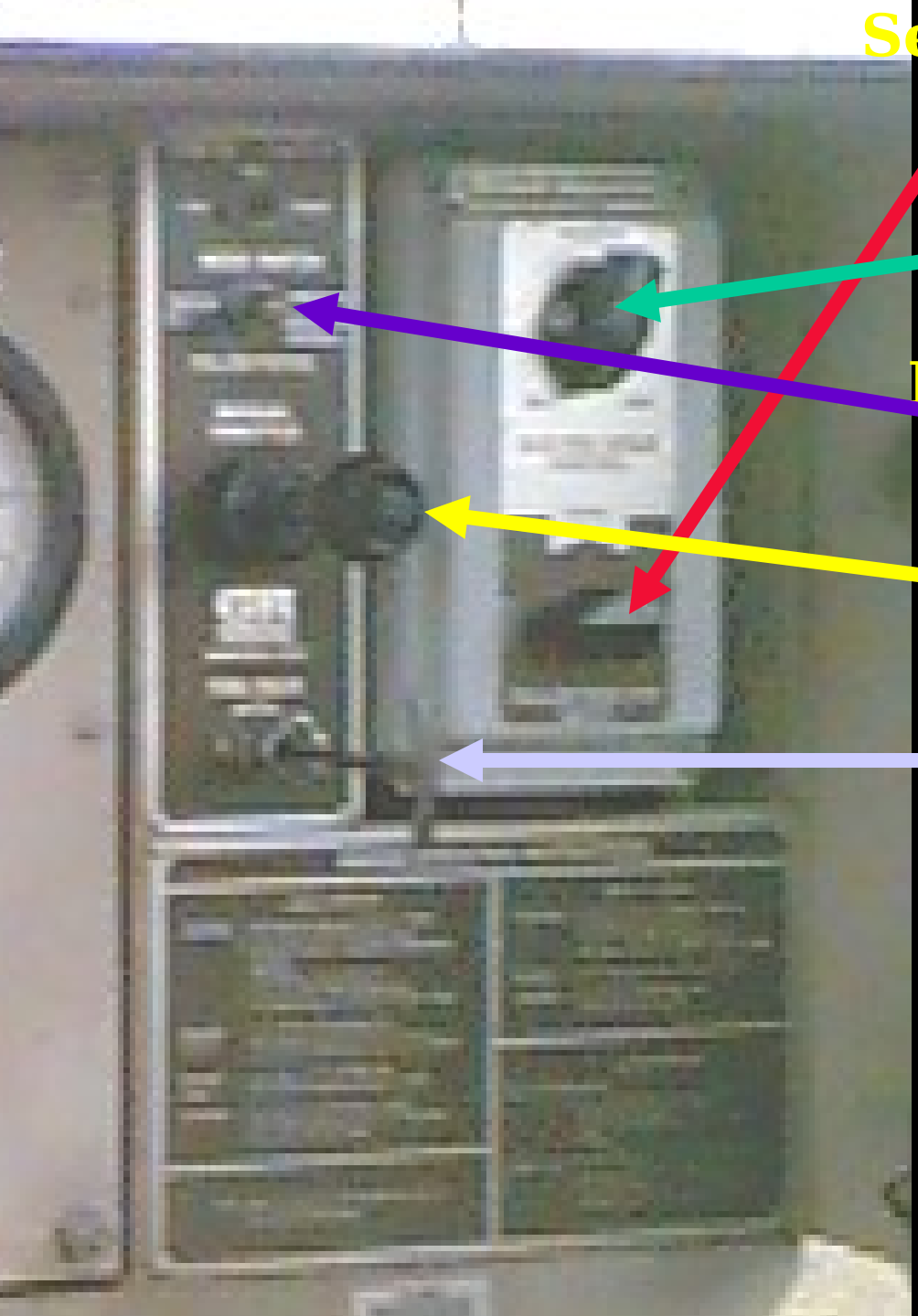
PREPOSITIONING VALVES

AND

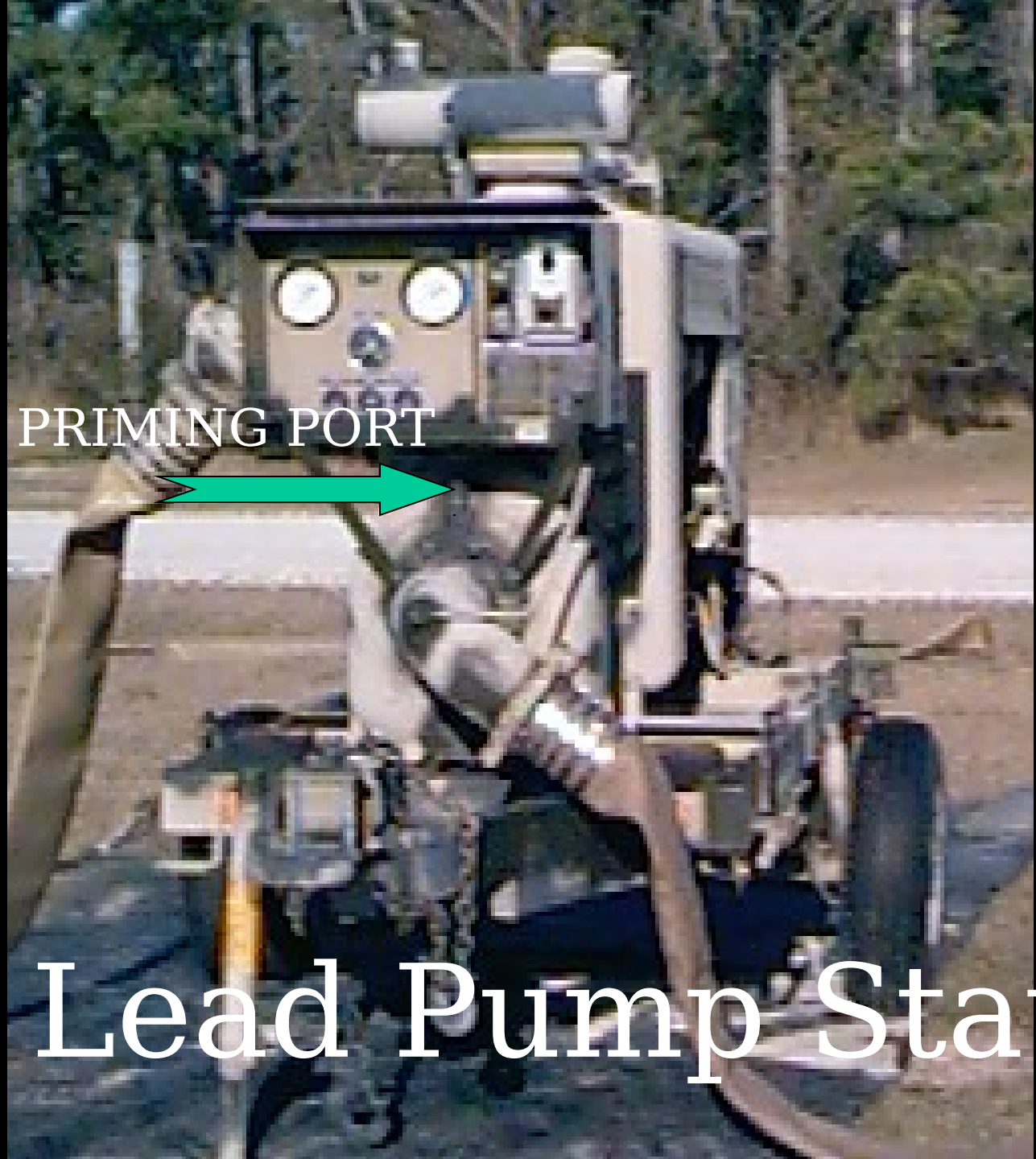
SWITCHES


Butterfly
Valve


CLOSE


Set pressure regulator to st
Turn electric manual spe
control to idle
Pull out engine mode swit
to manual
Throttle fully in
Pull fuel rack handle full
out and locked

BEFORE OPERATION CHECKS AND SERVICES



Lead Pump Station

360

VISUAL INSPECTION

OIL

FUEL

RADIATOR

FAN BELT

MISSING BOLTS

BATTERY


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
SEMPER FIDELIS
Dominance

TWDS

- Start Up The TWDS


Set engine run switch to sta
release to run engine

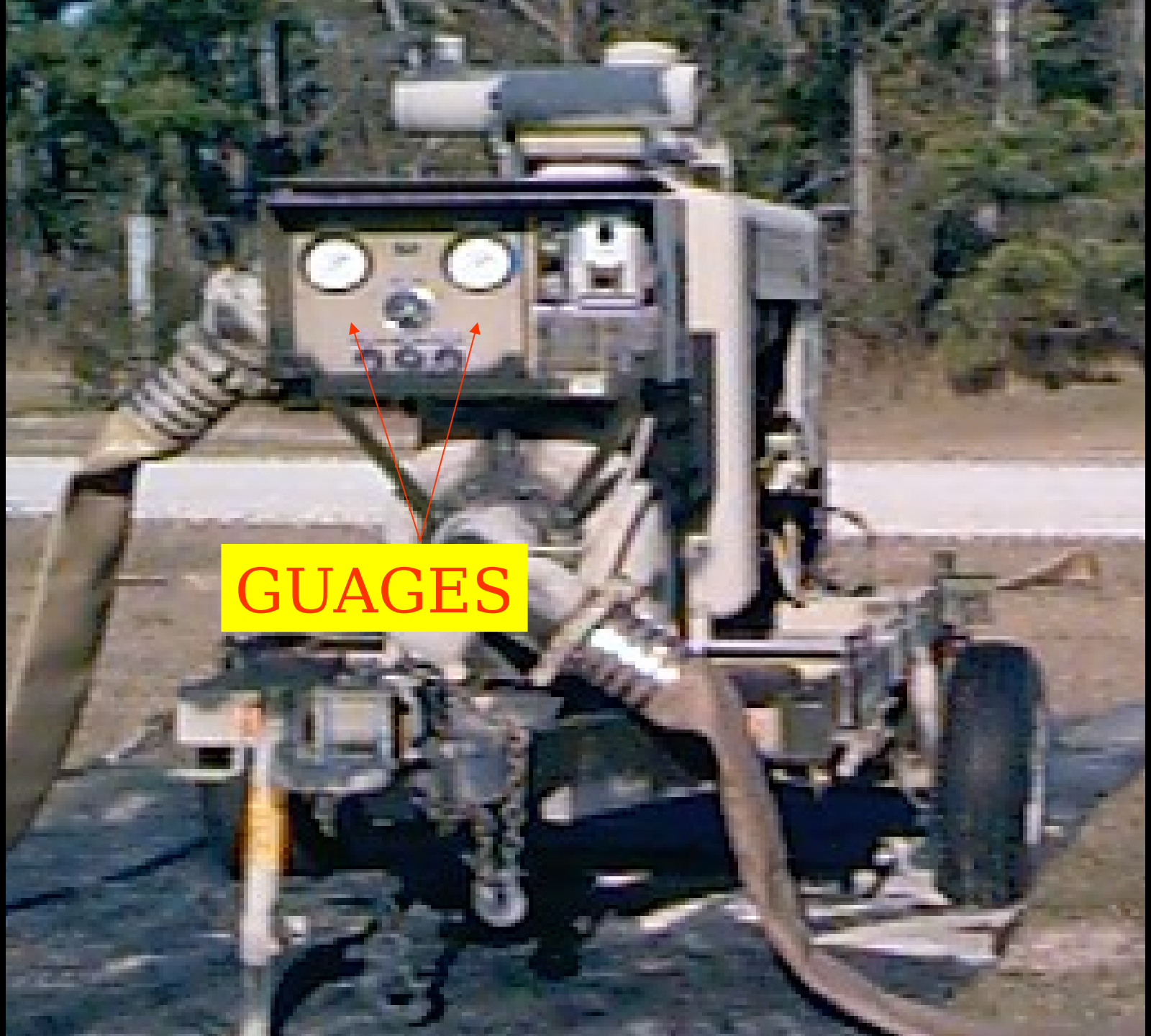
TURN THROTTLE TO OBTAIN 20 PSI

The engine alarm horn operates in each mode and will sound if:

- Engine operating temperature exceeds 220 F°
- Engine oil pressure falls below 10 psi
- Engine does not start within 30 seconds after Engine Run Switch is first set at Start position

If the engine alarm horn sounds, check the engine temperature gauge and the engine oil pressure. If the engine temperature or oil pressure is not within limits, set the Engine Run Switch at Off, and depress the Alarm


OPEN


GUAGES

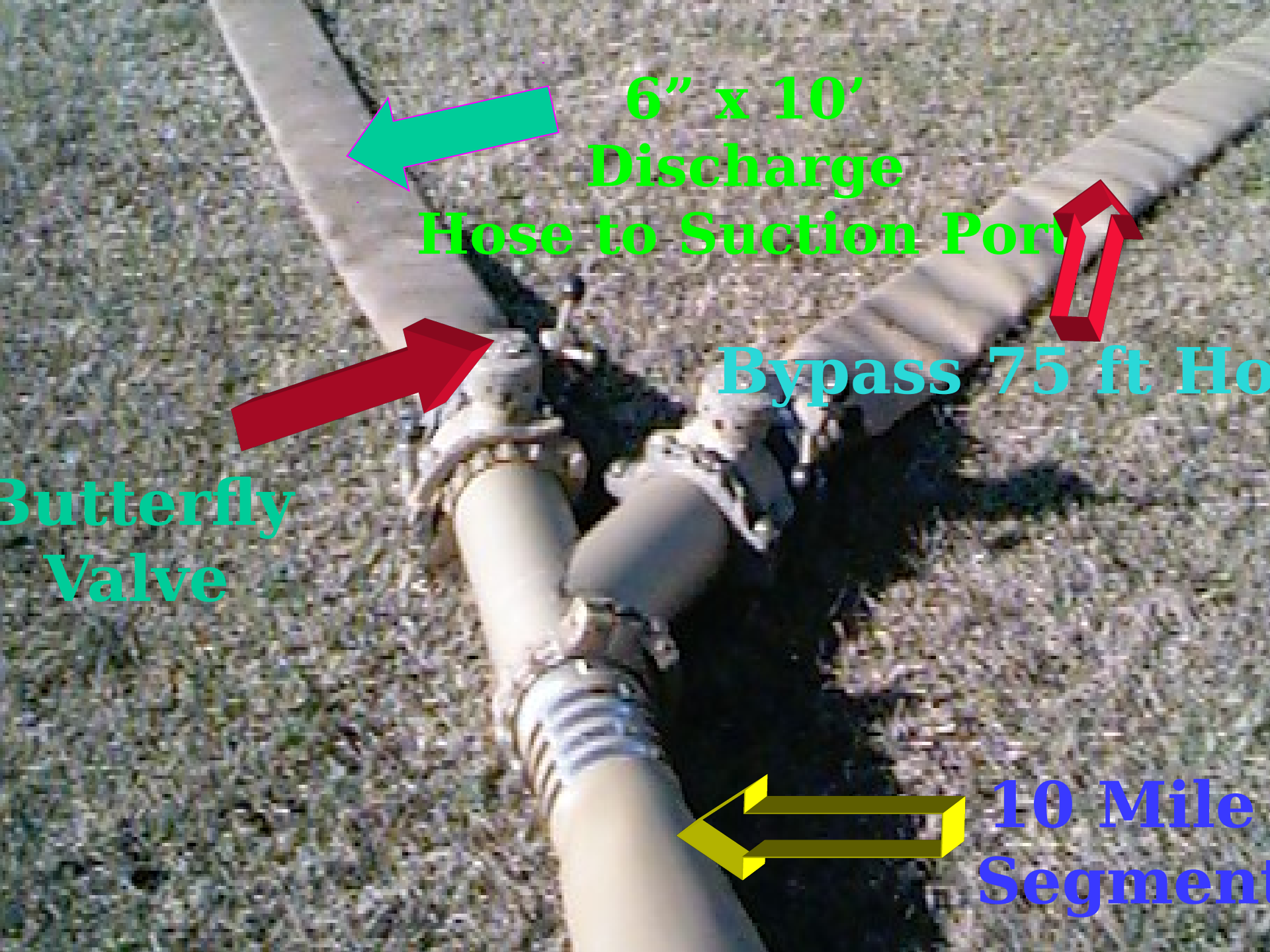
INSPECT
10 Mile Hose Line Segment

- KINKS
- TWISTS
- LEAKS
- OBJECTS

Do not start down line pumps until primed. While waiting for the water to come down line ensure, all valves are open

Priming Down Line Pumps

- Once lead pump is primed and operating it will feed water to the down line pump


6” x 10’
Discharge
Hose to Suction Port
Bypass 75 ft Ho
Butterfly
Valve
10 Mile
Segment

Priming Down Line (Boost) Pumps

360

VISUAL INSPECTION

OIL

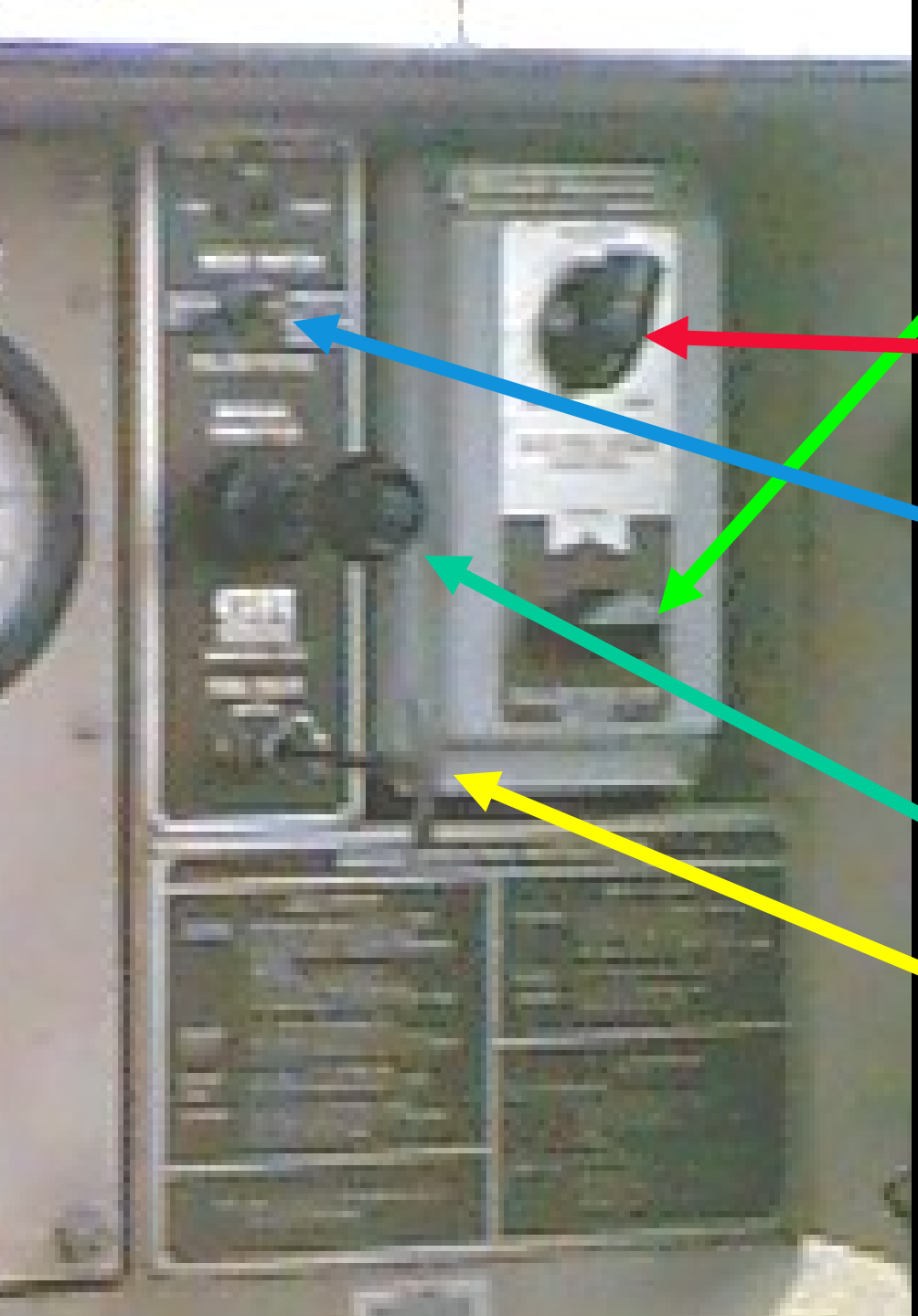
FUEL

RADIATOR

FAN BELT

MISSING BOLTS

BATTERY



Set pressure regulator to start

– **Turn electric manual speed control to idle**

– **Pull out engine mode switch to unlock and set pressure regulator to normal**

– **Throttle fully in**

– **Push fuel rack handle fully in and lock**

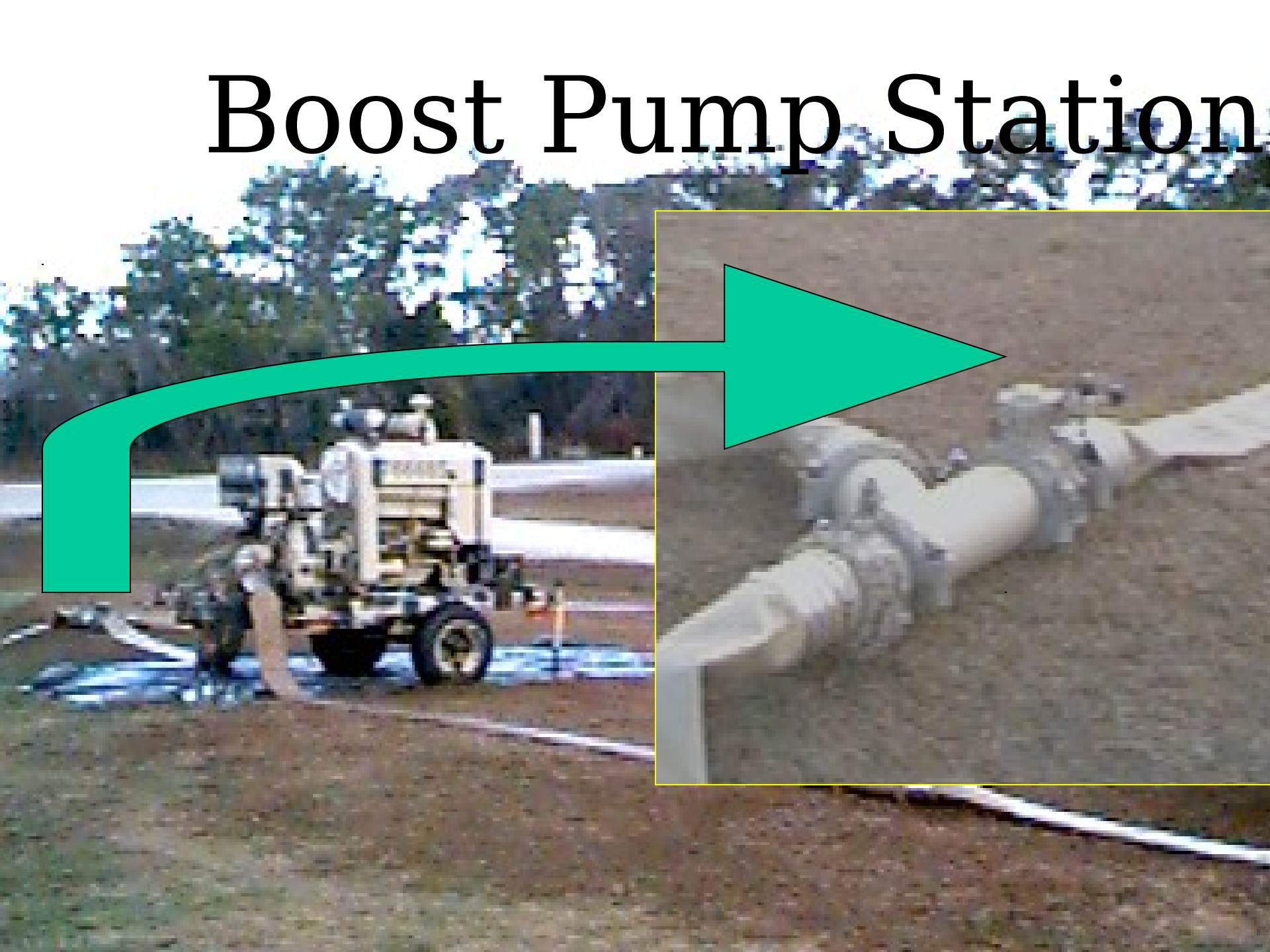

Set engine run switch to sta
release to run engine

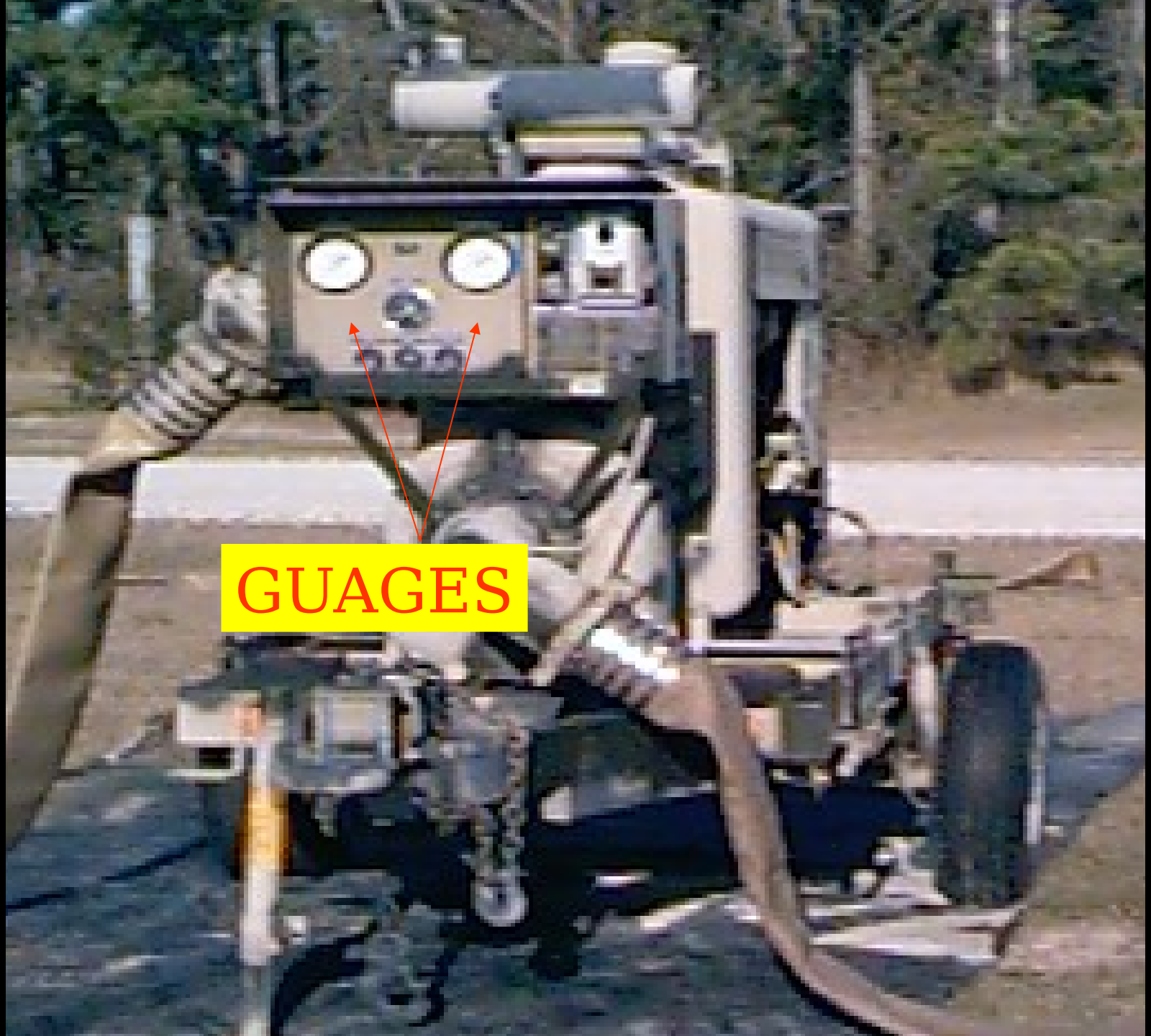
TURN THROTTLE TO THE FULL OUT POSITION

Set pressure regulator to AUTO.

Engine speed is now controlled by the pressure regulator.

Boost Pump Station




GUAGES

INSPECT
10 Mile Hose Line Segment

- KINKS
- TWISTS
- LEAKS
- OBJECTS

REPEAT THE SAME PROCEDURES FOR ALL OF THE REMAINING BOOSTER PUMPS

Storage And Distribution Points

- **Water column coming down line moves at about six mph.**
- **Using a water column to fill a 20k will slow down line progress of the column to 3mph while filling the 20k.**
- **Once 20k is full, close 4” supply valve.**

Operation of Distribution Point

- **Operation begins with the 125 gpm pump**
  - **PRIME**
  - **360 VISUAL INSPECTION**
  - **SET FUEL COCK TO OPEN**
  - **SPEED CONTROL TO START**
  - **DECOMPRESSION LEVER**
  - **TURN STARTING HANDLE**

Operation of Distribution Point

Operation of Hypochlorination UNIT after 125 GPM has started

- **fill reservoir with 5 gal of water**
- **add chlorine to water**
- **set pump stroke at 50%**
- **loosen nozzle tub nut and with hand, move foot valve up and down to prime suction line**
- **set flow rate valve at 5 and slightly open open flow regulator valve until proper reading is obtained**

- using 125 gpm pump open regulator valve until meter reads 5 gpm
- if air enters unit, vent thru small hole in top of pump and rest stroke adjustment to 50%
- operate for a few minutes, then take a chlorine residual test. If HTH is too high or low perform the following steps
  - high HTH- turn stroke to 30%, take residual test. If still high dilute solution. Repeat test.
  - Low HTH- increase stroke to 70% and take residual test. Continue until proper level is achieved.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UNITED STATES MARINE CORPS
SEMPER FIDELIS
Dominance


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
SEMPER FIDELIS
9 minute break


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
SEMPER FIDELIS
8minutebreak


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
SEMPER FIDELIS
Minute Break


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
SEMPER FIDELIS
Online Break


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
SEMPER FIDELIS
5 minute break


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
4 minute break


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
3 minute break


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
SEMPER FIDELIS
Minute Break


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
SEMPER FIDELIS
Minutebreak


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
SEMPER FIDELIS
Peace

TWDS

During Operation Checks and Services

600 GPM Pump (Lead Pump)

- **Operation should be at manual mode**
- **Ensure pump is at correct RPM’s**
- **Check fuel level**
- **Check oil level**
- **Check for leaks. (oil, fuel or water)**
- **Visual inspection**

10 Mile Hose Segment

- **Daily visual inspection.**
- **Ensure there is no interruption in the water line**
  - **Road Guards- Still operational**
  - **Suspension kits- have no major changes in operation**
- **Ensure no kinks**
- **Check for leaks at connections**
- **If repair needed, report to NCOIC so shut down can begin**

600 GPM Pump (Boost Pump)

- Check operation of pump, should be in electric mode
- Ensure pump is operating at correct Rpm's
- By-pass butterfly valve is closed. Only use by-pass if pump is disabled or performing maintenance
- Check fuel and oil level
- Check for leaks for fuel, oil and water
- Visual inspection

Distribution Points

- Check connection at 10 mile hose segment to distribution point for leaks and ensure gate valve works properly
- Perform visual on 125 GPM
- Add fuel and oil if necessary
- Ensure operation Is normal
- Visual of hypochlorinator
- Take chlorine residual
- Fill chlorine reservoir if needed
- Ensure hypochlorinator is set on correct pump stroke setting of 50%

TWDS

- **Shut Down**

Shut down will start with the last pump

- Place operator at each boost pump down line with a radio. Shut down the last pump down line from the lead pump.
  - Close the butterfly valve on the discharge side first.
  - Close valve on suction side
  - On boost pump set electric manual control at idle, set pressure regulator switch at electric , set engine run switch to off
- Repeat this process, working up to lead pump Via Radio.
- On lead pump set electric manual speed control at idle and set engine run switch at off
- Ensure supply gate valves to 20K’s are closed
- Shut down 125 gpm pump
- For short shut down on hypochlorinator, nothing has to be done

Any period of shut down longer than six (6) hours requires complete flushing of the hypochlorinator unit. Chlorine will damage equipment

AFTER OPERATION CHECKS AND SERVICES

OIL

RADIATOR

FUEL

AIR CLEANER

VISUAL INSPECTION

- FAN BELT
- MISSING BOLTS
- BATTERY

AFTER OPERATION CHECKS AND SERVICES

125 GPM PUMP

VISUAL INSPECTION

OIL

AIR FILTER

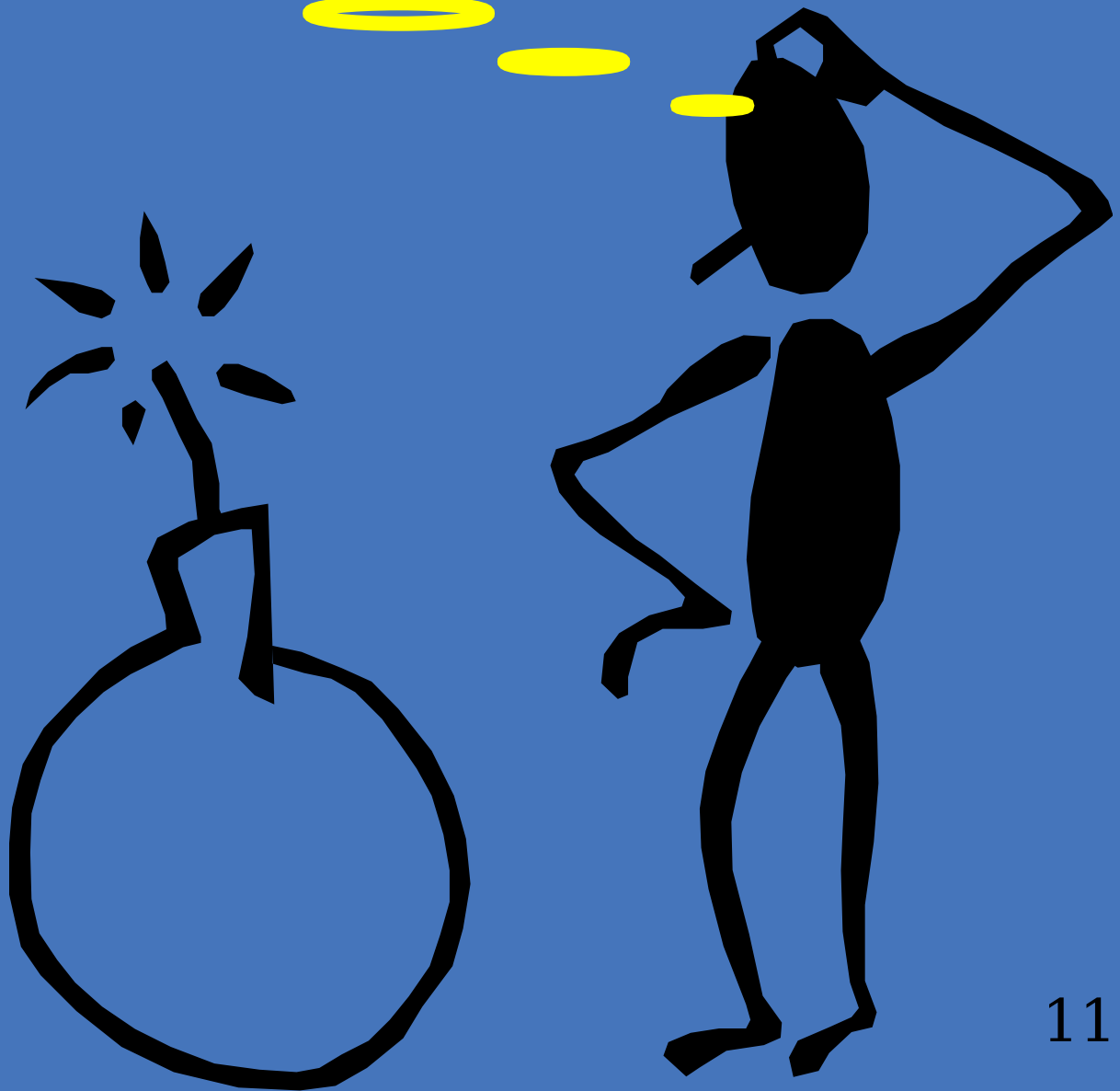
AIR RESTRICTOR

FUEL

LEAKS

DAMAGE

QUESTIONS?




DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
10 Minute Break


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
9 Minute Break


DEPARTMENT OF THE NAVY
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8 Minute Break


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4 Minute Break


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
3 Minute Break


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
2 Minute Break


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
1 Minute Break


DEPARTMENT OF THE NAVY
UNITED STATES MARINE CORPS
Stand By and
Take a Seat

TWDS

DISASSEMBLY AND STORAGE

Recovering/Storage of the TWDS

Upon completion of exercise, It will require specific procedures to ensure the life span of the equipment is ensured

This is done with a 250 CFM air compressor, and evacuation kit

DISPLACEMENT AND EVACUATION

Recovering Pump Station

- Drain the unit
- Connect to truck
- Drain and roll up bypass lines
- Preventive Maintenance on 600 GPM Pump
  - Oil - 6 qts (30 wt)
  - Radiator - Ensure it’s full
  - Fuel tank
  - Air cleaner (if clogged blow out with air compressor)
  - Visual Inspection

Recovering 20k Bags

- **Remove as much water as possible from the 20k**
- **Cap vent pipe and other outlet valve to tank**
- **Attach evacuator to remaining outlet line on tank Connect to air compressor**
- **Turn on air compressor and open valve on evacuator, this will create a vacuum removing water in the bag. Procedure will take 2-3 hrs. Once bag is packed, shut valve on evacuator and begin filling bag with air compressor. It will take 2-3 hrs.**

10 Mile Hose Segment

- After disconnecting hose from lead pump, disconnect the hose every 1000 ft.
- At the end of the 1000 ft install a Ball Catcher Assembly
- Starting at the lead pump station, place ball in the evacuator assembly and connect the assembly to the hose using victaulic coupling. Connect air compressor to evacuator
- Apply pressure to ball assembly, the air compressor will discharge the ball down the hose pushing out the water

ENSURE HOSE IS IN A SAFE DIRECTION AND NOT CONNECTED TO THE BOOST PUMP

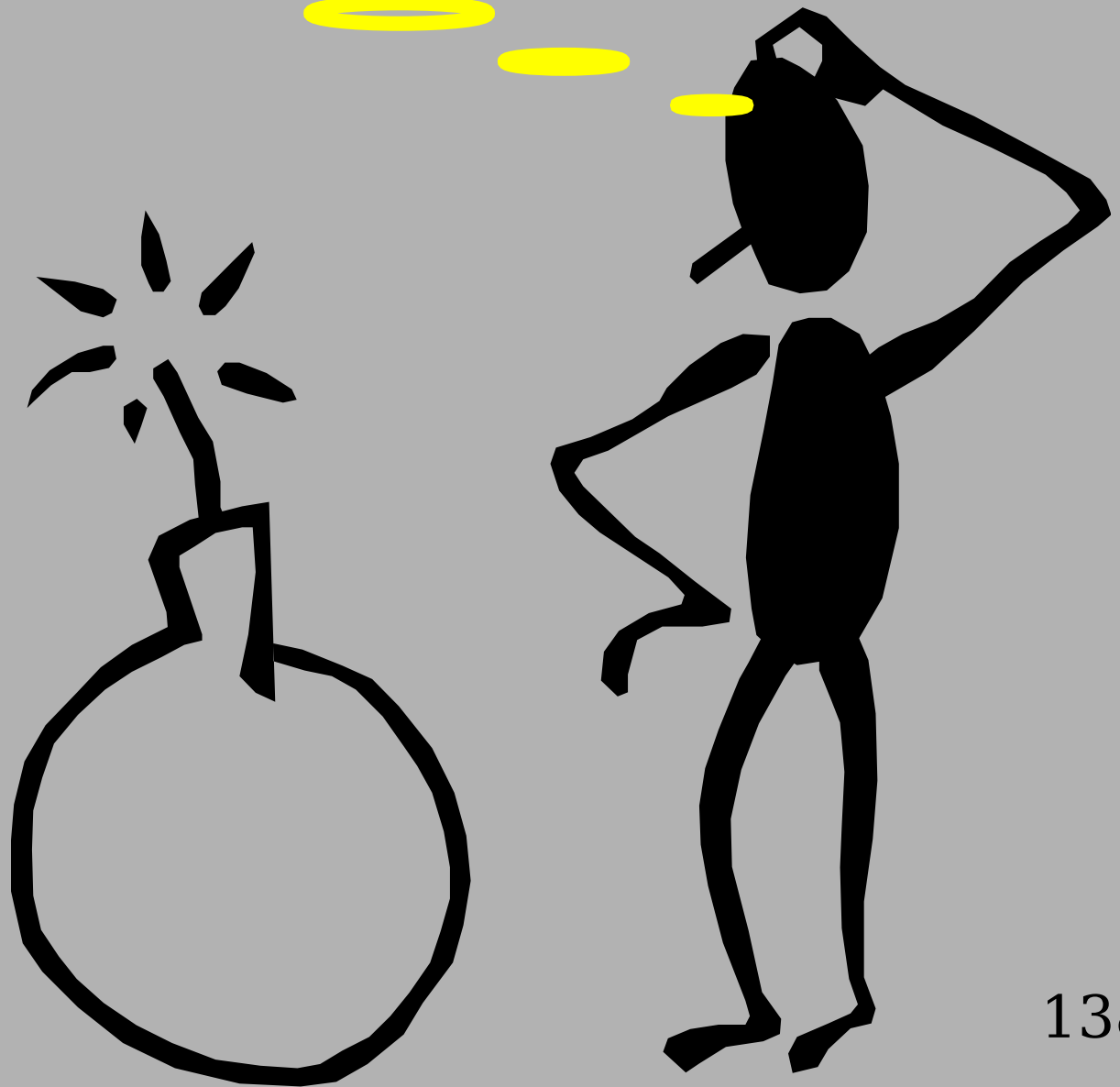
- Continue procedure every 1000 ft
- Start disconnecting hose every 500 ft
- Place an end cap of first hose
- Turn air compressor on
- Open valve creating a vacuum, pulling out moisture and seals the hose.
- Procedure take 10-15 minutes per hose.
- Once hose starts to cave in shut off air compressor. Remove evacuator and install another end cap.

- **Place hose in flaking box so end is exposed to packers.**

- **Then when completed remove both end caps and install gate. If done properly hose should fit perfect with 3 ft of space in box.**

- **This is repeated for remaining 10 miles of hose**

QUESTIONS?




10 Minute Break


9 Minute Break


8 Minute Break


7 Minute Break


6 Minute Break


5 Minute Break


4 Minute Break


3 Minute Break


2 Minute Break


1 Minute Break


Take A Seat


CONTROLLED
PRACTICAL
APPLICATION